US-PAT-NO: 5130935

DOCUMENT-IDENTIFIER: US 5130935 A
See image for Certificate of Correction

TITLE: Color image processing
apparatus for extracting image
                          data having predetermined
color information from among
                          inputted image data and for
correcting inputted image
                          data in response to the
extracted image data

DATE-ISSUED: July 14, 1992

US-CL-CURRENT: 382/167, 356/407 , **358/518**

APPL-NO: 07/ 408424

DATE FILED: September 14, 1989

PARENT-CASE:

   This application is a continuation of
application Ser. No. 07/030,618 filed
Mar. 27, 1987 now abandoned. BACKGROUND OF THE
INVENTION

   1. Field of the Invention

   The present invention relates to a color image
processing apparatus and
particularly to such an apparatus performing color
correction.

2. Related Background Art

Color correction of an image has been adopted in the field of printing or the like. For instance, if the skin color of a human is reproduced with a light green tinge, it is necessary to correct it to a more desirable skin color. However, whether the correction is to be carried out or the amount of correction has been mostly dependent upon experience and intuition. Such a problem arises not only with respect to the color of skin but also with respect to color of sky and the like.

SUMMARY OF THE INVENTION

The present invention has been made in view of the above problem. It is therefore an object of the present invention to provide a color image processing apparatus capable of performing an optimum color correction.

According to an aspect of the present invention, it is checked if a predetermined color is included in an original image and if the color exceeds in quantity a certain value. If the original includes such a color exceeding a certain value, a correction quantity is determined to perform color correction of the original.

According to another aspect of the present invention, a skin color, which is a most distinguishing color among colors of an original, is made an object of processing. If a **skin color** exceeding in quantity

a certain value is included in an original, a **correction** quantity is determined to automatically perform color **correction** of the tone of an overall original **image**, with emphasis upon a **skin color**.

The above and other objects of the present invention will become apparent from the following detailed description taken in conjunction with the accompanying drawings.

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Parent Case Text - PCTX (9):
According to another aspect of the present invention, a skin color, which is a most distinguishing color among colors of an original, is made an object of processing. If a **skin color** exceeding in quantity a certain value is included in an original, a **correction** quantity is determined to automatically perform color **correction** of the tone of an overall original **image**, with emphasis upon a **skin color**.

Detailed Description Text - DETX (3):

The color **image** processing apparatus of FIG. 1 is provided with an Luv
conversion unit 1, a first **skin color count unit 2,**
a second skin color count
unit 3, a pixel number discrimination unit 4, a maximum value discrimination
unit 5, a **correction** quantity operation unit 6, a color **correction** unit 7, an
RGB conversion unit 8, and a signal line 10. The color image processing
apparatus of FIG. 4 is provided with a CPU 40, a RAM 42, a ROM 41, an image
data input unit 43, and a color correction data output unit 44.

Detailed Description Text - DETX (6):
   The brief description of the first embodiment has been given as above. The
following is a detailed description therefor. FIG. 1 is a block diagram
showing the first embodiment image processing apparatus. An image is assumed
to be composed of RGB values. The circuit portion of FIG. 1 including the
units 1 to extracts a **skin color from an image** and obtains a **correction**
quantity, while the circuit portion including the units 7 and 8 performs color
correction in accordance with the obtained **correction** quantity. First, the
description will be directed to a procedure for extracting a skin color and
obtaining a correction quantity.

Detailed Description Text - DETX (16):
   First, RGB values are obtained from an original image using an unrepresented
image input device. In this case, all of the

pixels of the original are not
needed in judging if color correction is to be
performed, but the center
portion (e.g. region 50 of FIG. 7) of the original
omitting its periphery can
suffice even on the condition that every second or
third pixel within the
center portion be used. One of the reasons for
this is that in the color **image**
processing apparatus whose object is reproducing a
skin color since a skin
color such as that of a human face is located at
the middle of an original in
most cases, as shown in FIG. 7, it is possible to
use as its object region only
the region 50 including a **skin color** in judging if
color **correction** is to be
performed. Another reason is that since a skin
color changes abruptly, every
second or third pixel may suffice. On the
contrary, if an object to be
corrected is not located at the center of an
original, it is then necessary to
use as a judgment region the entire image or the
portion upon which an object
color concentrates.

Detailed Description Text - DETX (29):
   The determined correction quantity together with
the weight as explained in
FIGS. 10A and 10B is used for color correction to
obtain a natural skin color.
As compared with the method using a fixed reference
skin color shown in FIG. 8
wherein a **correction** quantity will become excessive
in a certain input **image,**
the correction quantity most suitable for the **skin**
color of an input **image** can
be calculated with the method of FIG. 11, and in

addition, there is no case where the **correction** quantity becomes too large.

Detailed Description Text - DETX (32):
As seen from the above description of the embodiments, by shifting a pixel location where pixels having a **skin color of an image** exist at a maximum to another pixel location of a **skin color** having a proper tone, it is possible to automatically perform **color correction of a skin color to a proper skin color**. Further, by incorporating the region outside the skin color region as an object region to be corrected, a smooth color correction can be achieved.

Detailed Description Text - DETX (33):
As an object color to be **corrected in the color image processing apparatus, a skin color** has been used since it is most sensitive and perceptible to humans and needs to be color-**corrected**. If color reproduction with high fidelity is desired, any desired color may be used as an object to be corrected.

Current US Cross Reference Classification - CCXR (2):
358/518